Interactive Computer Graphics & Multimedia

Unit I

Introduction to Computer Graphics: What is Computer Graphics, Computer Graphics Applications, Computer Graphics Hardware and software, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Two-dimensional graphics primitives: Points and Lines,
Line drawing algorithms: DDA, Bresenham's, Circle drawing algorithms: mid-point circle drawing algorithm, Bresenham's circle drawing, Filled area algorithms: Scan line: Polygon filling algorithm, boundary filled algorithm.

Unit II

Two/Three-Dimensional Viewing:The2-D viewing pipeline, windows, viewports, window to view port mapping; Clipping algorithms: mid-point subdivision algorithms, Sutherland-Cohen algorithm. Polygon clipping algorithm: Sutherland-Hodgeman polygon clipping algorithm.

Unit III

Basic transformations: translation, scaling, rotation, Matrix representations and homogenous coordinates, Composite transformations, Reflections, and shearing.
Three-dimensional graphics concept, Matrix representation of 3 D Transformations, Composition of 3-D transformation.

Unit IV

Viewing in 3D:Projections, types of projections: Parallel and Perspective projection.
Hidden surface removal: Introduction to hidden surface removal. Z-buffer algorithm, scanline algorithm, area sub-division algorithm.

UNIT V
Representing Curves and Surfaces: Parametric representation of curves: Bezier curves, B-Spline curves.
Illumination models-Ambient light, Diffused reflection, specular reflection and Phong model. Image manipulation, shading models for polygons, shadows, transparency. Filtering, image processing, geometric transformation of images.

Animation: Fundamentals of computer animation, Animation Techniques, Flash Overview.

Recommended Text and Reference Books:

1. "Procedural Elements for Computer Graphics", Author: David F. Rogers, Publisher: T.M.H
2. Second Edition.
3. "Fundamentals of 3Dimensional Computer Graphics", Author: Alan Watt, Publisher: Addision Wesley.
3. "Principles of Multimedia" Author: Ranjan Parekh, Publisher: McGrawHill Education
4. "Computer Graphics", Author: Donald Hearn and M.Pauline Baker, Publisher: PHI

Software Engineering

Unit I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths .Similarity and Differences from Conventional Engineering Processes. Process models: The Waterfall model, Incremental process models, Evolutionary process models.

Unit II

Software Requirements: Functional and non-functional requirements, interface specification, the Software Requirements Document.
Requirements Engineering Process: Feasibility studies, Requirements elicitation and analysis, requirements validation, requirements management.
Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

Unit III

Software Design: Design concepts, the design model.
Creating an architectural design: software architecture, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.
Software Measurement and Metrics: Various Size Oriented Measures, Function Point (FP) Based Measures.

Unit IV

Testing Strategies: Testing Objectives, validation testing, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing ,system testing..
Product metrics: Metrics for design model, metrics for testing, metrics for maintenance.
Test Drivers and Test Stubs , Structural Testing (White Box Testing), Functional Testing (Black Box Testing).

Unit V

Software Maintenance and Software Project Management:
Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance.
Risk Analysis & management: Software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.
Constructive Cost Models (COCOMO), Resource Allocation Models, An Overview of CASE Tools. Concept of software reliability.

Recommended Text and Reference Books:
1. "Software Engineering, A practitioner's Approach",Author: Roger S.Pressman, Publisher: Mc Graw Hill (6th edition ,International Edition)
2." Software Engineering", Author: Sommerville, Publisher: Pearson Education, 7th edition.
3. "Software Engineering principles and practice", Author: Waman S Jawadekar, Publisher: The Mc Graw-Hill Companies.

Introduction to Artificial Intelligence

Unit I

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Unit II

Introduction to Search: Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Heuristic algorithms- A* , AO* Algorithms , Best First search, Hill Climbing ,Constraint satisfaction , Adversarial Search, Search for games, Alpha - Beta pruning.

Unit III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution,
Unit IV

Machine Learning: Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning. Probabilistic reasoning, Utility theory, Bayesian Networks.

Unit V

Pattern Recognition: Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Expert Systems and Applications of AI.

Recommended Text and Reference Books:

1. "Introduction to A.I and Expert Systems", Author: DAN.W. Patterson, Publisher: PHI, 2007.
2. "Artificial Intelligence - A Modern Approach", Author: Russell & Norvig, Publisher: LPE, Pearson Prentice Hall, 2nd edition, 2005.
3. "Artificial Intelligence", Author: Rich & Knight, Publisher: Tata McGraw Hill, 2nd edition, 1991.

Analytical Programming Using Python Concepts

Unit I

Python data structures, Control statements, Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and Elif statement in Python, Expression Evaluation & Float Representation. Loops: Purpose and working of loops , While loop including its working, For Loop , Nested Loops , Break and Continue Function: Parts of A Function , Execution of A Function , Keyword and Default Arguments ,Scope Rules. Strings: Length of the string and perform Concatenation and Repeat operations in it. Indexing and Slicing of Strings.

Unit II

Tuples , Unpacking Sequences , Lists , Mutable Sequences , List Comprehension , Sets , Dictionaries Higher Order Functions: Treat functions as first class Objects , Lambda Expressions Exception handling, Implementation of user-defined Modules and Package, File handling in python.

Unit III

Knowledge domains of Data Analysis, Understanding structured and unstructured data, Data Analysis process, Dataset generation, Importing Dataset: Importing and Exporting Data, Basic Insights from Datasets, Cleaning and Preparing the Data: Identify and Handle Missing Values.

Unit IV

Data Formatting, Exploratory Data Analysis, Filtering and hierarchical indexing using Pandas. Data Visualization: Basic Visualization Tools, Specialized Visualization Tools, and Plotting Maps.

Unit V

Implementations of Satistical Techniques Using Python.

Recommended Text and Reference Books:

1. "Learning Python", Author: David Ascher and Mark Lutz, Publisher: O'Reilly Media
2. "Python Programming using Problem Solving approach", Author: Reema Thareja, Publisher: Oxford University press
3. "Python for Data Analysis", Author: Wes Mckinney, Publisher: O'Reilly Media.
4. "Web Analytics: An Hour a Day", Author: Avinash Kaushik, Publisher: Wiley

Computer Graphics Lab

1. Write a program to implement Bresenham's line drawing algorithm.

2. Write a program to implement mid-point circle drawing algorithm.

3. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.

4. Write a program to clip a polygon using Sutherland Hodgeman algorithm.

5. Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).

6. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.

7. Write a program to draw Hermite/Bezier curve.

8. Write a program to draw a rectangle with filled colour.

9. Write a program to draw a car.

10. Write a program to make PUZZLE Game.

11. Write a program to draw a rectangle with in a circle.

12. Write a program to draw a FACE.

13. Any other program related to Graphics and Animations.

IoT & Cloud Computing

Unit I

Introduction Cloud-definition, benefits, usage scenarios, History of Cloud Computing - Cloud Architecture - Types of Clouds - Business models around Clouds – Major Players in Cloud Computing- issues in Clouds - Eucalyptus - Nimbus - Open Nebula, Cloud Sim.

Unit II

Cloud Services Types of Cloud services: Software as a Service-Platform as a Service –Infrastructure as a Service - Database as a Service - Monitoring as a Service –Communication as services. Service providers-Google, Amazon, Microsoft Azure, IBM, Sales force.

Unit III

Virtualization For Cloud Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

Unit IV

Introduction to IOT - Definition & Characteristics, Importance of IoT, Physical Design of IOT, Logical Design of IOT, IOT Enabling technologies, IoT and M2M, IOT Platform Design Methodology, Purpose & Requirements Specification, Process Specification, Domain Model Specification, Information model Specification, Service specification, IOT level Specifications, Functional View Specifications, Operational View Specification, device and component integration, application development

Unit V

Iot Smart X Application - Smart Cities, Smart Energy & Smart Grid, Smart Mobility & transport, Smart Home, Smart Building & Infrastructure, Smart Factory & Manufacturing, Smart Health, Smart Logistics & Retails. Embedded suite for IoT Physical device, Internet of things Challenges: Vulnerabilities of IoT, Security, Privacy & Trust for IoT, Security requirements Threat analysis, Use cases and misuse cases.

Recommended Text and Reference Books:
1. "Cloud Computing, Implementation, Management and Strategy", Author: John Rittinghouse & James Ransome, Publisher, CRC Press, 2010.
2. "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate", Author Michael Miller, Publisher: Que Publishing, August 2008.
3. "Internet of Things – A hands-on approach", Author: Arshdeep Bahga, Vijay Madisetti, Publisher: Universities Press, 2015.
4. "The Internet of Things Enabling Technologies, Platforms, and Use Cases", Author: Pethuru Raj, Anupama C. Raman, Publisher: CRC Press Taylor & Francis Group.

Information Security & Cyber Laws

Unit I
Introduction to Information System, Type of information system, Development of information system, CIA model of Information Characteristics, Introduction to Information Security, Need of Information Security, Cyber Security, Business need, Ethical and Professional issues of security.

Unit II
Information Security Model, Component of an Information security, Aspect of information security, Security attacks (Active and Passive Attacks), Security mechanism and Security Services (X.800).

Unit III
Information Security Techniques, Introduction to Cryptography: Terminology, cryptanalysis, Security of algorithms, Substitution Cipher and Transposition Cipher, Single XOR , One-way Pad, Cryptographic Protocols-I: Arbitrated and Adjudicated Protocol, One- Way Hash function

Unit IV
Cryptographic Protocols-II: Public key cryptography, Digital Signature, Digital Watermarking Technique: Characteristics and Types ,Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies- Sample Security Policies.

Unit V
Cyber Laws I: Information Security Standards, IT act 2000 Provisions, Introduction to digital laws, Cyber Laws II: cyber laws, intellectual property rights, copyright laws, patent laws, software license.

Recommended Text and Reference Books:

1. "Principles of Information Security", Author: Michael E. Whitman and Herbert J. Mattord, Publisher: SixthEdition, Cengage Learning, 2017.
2. "Information Security Policies, Procedure, and Standards: A Practitioner's Reference", Author: Douglas J. Landoll, Publisher: CRC Press, 2016.
3. "Handook of information security management", Author: Harold F. Tipton, and Micki Krause, Publisher: Archtech Publication, Sixth Edition, 2007.
4. "Cryptography and Network Security: Principles and Practice", Author: William Stallings, Publisher: Pearson , Sixth Edition, 2014.

Soft Computing

Unit I
Introduction To Neural Networks & its Architecture: Neural Networks Neuron, Nerve Structure And Synapse, Artificial Neuron And Its Model, Activation Functions. Single Layer And Multilayer Feed Forward Networks, Recurrent Networks. Perception and Convergence Rule. Supervised Learning Network & Unsupervised Learning Network.

Unit II
Back Propogation Networks: Perceptron Model, Solution, Single Layer, Multilayer Perception Model; Back Propogation Learning Methods, Effect Of Learning Rule Co-Efficient, Back Propagation Algorithm, Applications.

Unit III
Fuzzy Logic Introduction: Basic Concepts Of Fuzzy Logic, Fuzzy Sets And Crisp Sets, Fuzzy Set Theory And Operations, Properties Of Fuzzy Sets ,Fuzzy And Crisp Relations, Fuzzy To Crisp Conversion, Membership Functions, Interference In Fuzzy Logic, Fuzzy If-Then Rules, Fuzzyfications & Defuzzificataions.

Unit IV
Genetic Algorithm: Basic Concepts, Working Principle,Procedures Of GA, Flow Chart Of GA

Unit V
Genetic Algorithm-II: Genetic Representations, (Encoding), Genetic Operators, Mutation, Generational Cycle.

Recommended Text and Reference Books:

1. "Neural Networks,Fuzzy Logic and GeneticAlgorithm:Synthesis and Applications", Author S. Rajsekaran& G.A. Vijayalakshmi Pai, Publisher: Prentice Hall of India, 2003.

2. "Introduction to Neural Networks", Author: Anderson, James, Publisher: PHI Publication, Delhi, India.

3. "Artificial Intelligence and Intelligent Systems", Author: N.P. Padhy, Publisher: Oxford University Press, USA,2005.

4. "Neural Networks and Learning Machines", Author: Simon Haykin, Publisher: Prentice Hall of India, 2005,Third Edition.

Data Science and Machine Learning Techniques

Unit I

Introduction to data Science: Overview, Terminology in Data Science, Applications of Data Science.

Three Pillars of data science- Programming, Mathematics and statistics, Business knowledge/intelligence, BI Vs Data Science.

Basics of Data science: Defining Objective of study, Population(universe), collection of data-census, method of sampling, Tools of collecting data-questionnaire, telephonic conversation, emails, SMS, online surveys, Classification of Data-based on various parameters- Age, income, gender, education etc

Unit II

Exploratory data analysis, Machine Learning and Deep Learning – Big Data, Data Ingestion, and Data Munging.

Machine Learning Overview: Types of Learning,Introduction of Machine Learning Approaches– Artificial Neural Network, Clustering, Reinforcement Learning, Decision Tree Learning, Bayesian Networks, Support Vector Machine. Issues in Machine Learning. Data Science Vs Machine Learning.

Unit III

Regression: Linear Regression and Logistic Regression

Support Vector Machine: Introduction, Types of support vector kernel, Properties and issues in SVM.

Unit IV

Decision Tree Learning - Decision tree learning algorithm, Inductive bias, Inductive inference with decision trees, Entropy and information theory, Information gain, Issues in Decision tree learning.

Unit V

Deep Learning - Introduction, concept of convolutional neural network, Types of layers – (Convolutional Layers, pooling, fully connected), Training of network.

Recommended Text and Reference Books:

1.”Machine Learning”, Author: Tom M. Mitchell,Publisher: McGraw-Hill Education (India) Private
     Limited, 2013.
2. “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, Author: Ethem
Alpaydin, Publisher: The MIT Press 2004.
3. “Machine Learning: An Algorithmic Perspective”, Author: Stephen Marsland, Publisher: CRC Press,
     2009.
 4. “Pattern Recognition and Machine Learning”, Author: Bishop, C., Publisher: Berlin: Springer-Verlag